OBSERVATIONS ON THE BIOLOGY OF THE PRAYING MANTIS *CREOBATER URBANA* FABR. (ORTHOPTERA: MANTIDAE)[1]

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Observations on the biology of a species of Indian mantis, namely *Creobater urbana* Fabr. have been discussed in the text. The egg laying interval was predictable. The data shows a gradual decrease in the number of young that hatched out irrespective of the size of the ootheca. The species does not appear to be parthenogenetic. The life–history of the young has also been discussed. A parasite on the ootheca of mantises was identified. Coexistence of ants with developing praying mantis embryo inside the ootheca was also noticed.

INTRODUCTION

Praying mantises are known for their subtle way of hunting and their total dependence on live animal food. This quality has attracted attention towards using them as insect predators. *Creobater urbana*, one of the more than 1800 species of mantises in the world, is a medium sized mantis found commonly in Bangalore. Individuals are seen on bushes and are often attracted by light. However, not much is known about its biology. In this paper we discuss observations made on its food preference, egg laying behaviour and life—history.

Food: An adult *C. urbana* female was brought to the laboratory on 31 July 1983. It was maintained in a transparent polythene cage and readily accepted most of the insects offered as food. Table 1 shows the variety of insects it either took or rejected. It lived for 4 months and died on 30 November 1983. During the first month it was fed every day with one or more of whatever kind of insects were available. Later, due to difficulty in getting insects, it was fed every alternate day. A few like the *Danaus*, the common Aristolochia butterflies and a species of wingless grasshopper, were caught, tasted and rejected. The butterflies are known to carry toxins in their bodies acquired from the plants on which their larvae feed. The grasshopper too was unacceptable.

Mantises are normally ambush hunters. This was actually what we observed though at times, when very hungry, our mantis used to search and take the prey. This behaviour has been reported by Inoile and Matsura (1983) as 'active searching'.

Egg–laying: On the third day after it was brought to the laboratory, the female mantis produced an ootheca (egg). More oothecae were produced at predictable intervals (Table 2) and before it died 11 oothecae were produced. It preferred to lay on wood and would not lay on the smooth sides of its polythene cage. The interval between the second and third ootheca was increased by a day as no branch was provided. On providing a branch it immediately got on to it and laid.

The normal pre–laying behaviour that we observed was non–acceptance of food for at least a day before the act. The mantis would be dull and inactive. This was a clear indication of laying.

Often the branch was provided on seeing this behaviour. The mantis always took an upside down posture while laying, pushing the frothy white egg mass upwards. The white frothy mass dries into a creamy white hard ootheca. After the process was completed, the branches were taken out, the oothecae measured for length, labelled and maintained in separate cages. The mantis usually fed after laying.

The laying interval (Table 2) was 7 days initially. It then abruptly increased to 10 days and gradually from 10 to 15 days before the mantis died. The mean number of days 9.1± 1.9 was calculated excluding the last interval of 15 days.

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(Details of the last ootheca have not been included in calculating means as by then the mantis was worn out and had become very dull and inactive.) The sudden change in the laying interval from 7 to 10 days can be related to the change in food availability. When fed every day, the interval was 7 days (except between the second and third) and when fed every alternate day it became 10 days. Mastura and Morooka (1983) also claim that with more food, the interval between ovipositions is shortened. The egg size they say was nevertheless fixed in the mantis *Paratenodera angustipennis*. This tendency has been observed in the mantis *C. urbana* too as the mean egg length was 31± 3.4 mm with a variation of only 10.9% compared to the 20.8% variation in the laying interval. Ageing may also have affected the interval, particularly between the last 2 or 3 eggs.

All the eleven oothecae hatched. The mean time taken was 33.5± 2.5 days (CV 7.4%, Table 2). The number of young was 45.3± 12.2 per ootheca with a variation of 26.9%. This variation is much higher compared to the variation in ootheca length (CV of 10.9%). The data shows a gradual decrease in the number of young that hatched out irrespective of the size of the ootheca. This is not easy to explain. Nevertheless there is a possibility of a reduction in the number of viable

TABLE 1
LIST OF INSECTS FED TO THE MANTIS *Creobater urbana*

Accepted	Rejected
Adults	
Diptera	Wingless grasshopper
Mantis (*Humbertiella* sp.)	(Orthoptera: Acrididae)
Lymantrid moths (Lepidoptera)	
Geometrid moths (Lepidoptera)	*Danaus* sp.
(Lepidoptera: Danaidae)	
Polytela gloriosae	
(Lepidoptera: Noctuidae)	*Tros aristolochia*
(Lepidoptera:Papilionidae	
ARCTIIDAE (Lepidoptera)	
Hypsa ficus (Lepidoptera: Hypsidae)	*Polydorus hector*
(Lepidoptera: Papilionidae)	
Achoea janata	
(Lepidoptera: Noctuidae)	
Grasshoppers (Orthoptera: Acrididae)	
Katydids (Orthoptera: Tettigonidae)	
Asura conferata (Lepidoptera: Lymantridae)	Parellelia algira (Lepidoptera: Noctuidae)
Corcyra cephalonica (Lepiodoptera: Pyraustidae)	
Crickets (Orthoptera: Gryllidae)	
Eurema hecabe (Lepidoptera: Pieridae)	
Catopsila sp. (Lepidoptera: Pieridae)	
Lycaenidae (Lepidoptera)	
Nymphs	
Bracon hebetor	
(Hymenoptera: Braconidae)	*Prenolepis longicornis*
Drosophila melanogaster	(Hymenoptera:Formicidae)
LYCAENIDAE (Lepidoptera)	

sperms stored in the spermatheca with increasing age of the insect. Though parthenogenesis is known in praying mantises (Mani 1968) we believe that the female was inseminated before it was brought to the laboratory. It refused to mate in the laboratory and both the males introduced on different occasions were killed. The number of oothecae it produced before it came to the laboratory is also not known. A preadult nymph that moulted into an adult female in the laboratory did lay eggs but none hatched. This insect surely had not mated. This supports our view that the species is not parthenogenetic.

Life history: Eggs hatched into brown, ant—like young. They were very active, always carrying the abdomen curled up. This persisted till they got their wings. The first batch that hatched out did not survive for more than two days. The other ten were able to survive and a few became adults. Most of the young were released due to difficulty in maintaining them. The ones that we maintained were observed carefully. They started feeding on the third day. They readily caught and ate the tiny hymenopteran parasite *Bracon hebetor* (Braconidae). Later Drosophila, and gradually, as they grew, moths of *Corcyra cephalonica* and lycaenid butterflies were accepted (Table 1). The first moult was observed 2 weeks after hatching and subsequent moults had intervals of 9 to 20 days. In about 77 days a few became adults after 6 moults. Adults are green with a yellow eye—spot on the wings. The change of colour from brown to green took place after the second or third moult. Mortality was generally high during various stages of development. Cannibalism was also observed. Adult longevity is not known.

A few other species of mantises kept in the laboratory at the same time have yielded some interesting information. Two large oothecae were brought to the laboratory. These had been colonised by small colonies of ants belonging to the genus *Crematogaster*. The ants were fed and maintained. Ten days later about a hundred praying mantises hatched out of one of the oothecae. The ants started attacking them and had to be separated. Many died at various stages of development; only one nymph became an adult. It moulted eight times and took 108 days. The

TABLE 2

EGG—LAYING, OOTHECA SIZE AND NUMBER OFNYMPHS HATCHED IN *Creobater urbana*

Sl. No.	Date of laying	Laying interval (days)	Length of ootheca (mm)	Date of hatching	Time taken to hatch (days)	No. of nymphs hatched
1.	3 Aug 83	–	33	6 Sep 83	34	53
2.	10 Aug 83	7	30	12 Sep 83	33	54
3.	18 Aug 83	8	37	20 Sep 83	33	50
4.	25 Aug 83	7	29	28 Sep 83	34	53
5.	1 Sep 83	7	32	6 Oct 83	35	60
6.	11 Sep 83	10	31	14 Oct 83	33	42
7.	21 Sep 83	10	33	23 Oct 83	32	40
8.	1 Oct 83	10	27	30 Oct 83	29	43
9.	12 Oct 83	11	33	14 Nov 83	33	42
10.	24 Oct 83	12	25	2 Dec 83	39	16
11*.	8 Nov 83	15	14	20 Dec 83	42	10
Mean		9.1	31		33.5	45.3
SD		1.9	3.4		2.5	12.2
CV %		20.8	10.9		7.4	26.9

Has not been included in calculation of mean

adult was large and straw coloured. The identity of this species has not been determined. Out of the other oothecae more than twenty hymenopteran parasites of the genus *Podagrion* (Chalcidae) emerged, followed a few days later by praying mantis nymphs. A few were raised and one became an adult female after 7 moults (198 days). It lived for 2 months and then died. The mantis has been identified as *Heirodula* sp. *Humbertiella* sp., a bark—dwelling mantis. Eggs were laid, and took 32 days to hatch; about 60 nymphs emerged from each ootheca.

It has been reported that mantises moult 3–12 times before they become adults (Mani 1968). Our observations have shown a remarkable variation in the time taken to become adults in the three species. The chalcid wasp is considered to be a common parasite on the ootheca (Mani 1968). The co—existence of *Crematogaster* ants with the developing mantises inside the oothecae has also been noted by Lefroy (1909).

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